REMARKS/ARGUMENTS

The Examiner's Final Office Action mailed March 4, 2005 has been carefully reviewed. Reconsideration of this application, in view of the amendments the claims, new claims 20-24, and the following remarks, is respectfully requested.

Examiner rejected claims 16-19 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,142,417 to Cashdollar et al [hereinafter Cashdoller] in view of U.S. Patent 4,780,832 to Shah [hereinafter Shah].

Examiner states that Cashdollar discloses a method of measuring temperature in a furnace (coal-fired burner), the method comprising:

positioning a pyrometer (1) having an optical head in a port of the furnace, with a line of sight intersecting a passage of gas in the furnace containing a plurality of gas components in the furnace;

receiving IR radiation from the gas as it passes the line of sight;

converting the infrared radiation in the optical head to electrical signals (using detectors 7);

providing a photometer circuit connected to the optical head for processing electrical signals;

providing a scaling circuit connected to the photometer circuit for scaling the electrical signals; and scaling the electrical signals to maximize the signals;

providing an output circuitry (e.g., in computer) connected to the scaling circuit for receiving electrical signals and producing output signals; and

providing an output means (e.g., a graphical display) connected to the output circuit for displaying the output signal as a temperature measurement;

wherein the electrical signals are obtained from IR radiation having a wavelength range of about 1.3 to 3.1 microns, the wavelength being about 1.38 (about 2.7) for sensing the temperature of H20 in the gas, and the wavelength being in the range of about 1.8 and 3.1 microns for sensing the temperature of H20 or CO2 in the gas (see figures 1 and 4; column 3, lines 3-7 and 16-44; column 3, line 65 – column 4, line 63-column 5, line 55; and column 6, lines 41-60).

Examiner correctly identified that Cashdollar does not disclose positioning the pyrometer in a port of the furnace. Examiner states that Shah discloses a pyrometer for measuring the temperature of gas in a furnace (20). The pyrometer is positioned in a port of the furnace such that the pyrometer has a line of sight that intersects a passage of gas containing a plurality of gas components in the furnace for receiving direct IR radiation from the gas as it passes the line of sight to convert the radiation to electrical signals for obtaining a temperature measurement. Examiner states that Shah teaches that it is beneficial to place the pyrometer in a port of a furnace in order to receive direct IR radiation for obtaining real time temperature measurements (see column4, line 638-47; column 4, lines 11-20).

Examiner therefore opines, referring to claim 16, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed in Cashdoller by positioning the pyrometer in a port of the furnace, as taught by Shah, in order to receive direct IR radiation from the gas being measured.

Examiner considered Applicants arguments of February 10, 2005 with respect to claims 16-19, but considered Applicants earlier arguments moot in view of the new ground(s) of rejection.

Applicants have amended independent base claim 16 to provide additional steps in order to further clarify and distinguish the method of measuring temperature according to the present invention.

Both Cashdollar and Shah provide a method of measuring infrared radiation emitted from a combustion chamber and calculating gas temperature based upon infrared measurements. Similarly, the present invention utilizes infrared radiation emitted from a combustion chamber to calculate gas temperature. However, unlike the prior art the present invention provides an improved method of measuring and calculating the temperature of combustion gas in a combustion chamber.

During normal operation, furnace pyrometer's are subject to explosive conditions and extreme temperatures capable of reaching in excess of 3000 F. Cashdollar provides the essence of their invention is to provide a pyrometer construction capable of withstanding the high pressure of an explosion while simultaneously recording particle and gas temperatures. (column 1, lines 52-57).

Cashdollar, however, fails to teach or suggest steps for protecting the pyrometer's lens tube or electrical components from degradation associated the extreme conditions to which the pyrometer is exposed to when taking temperature measurements. To keep bridge channel circuits all at the same temperature, Cashdollar teaches utilization of an aluminum heat sink 11between the six detectors (7a to 7f) and the six dark detectors (19a to 19f) of the bridge circuit. (column 5 lines 33-35). Cashdollar further provides the bridge circuit is then amplified into an output signal that is fed through a connector on the detector/amplifier housing to an external recording device (not shown), which can later be sent to a computer for calculations. (column 5, lines 36-55)

Cashdollar fails to teach or suggested steps for cooling the lens tube. Cashdollar further fails to teach or suggest providing a watertight electrical enclosure connected to the lens tube for housing electrical components, and providing the enclosure with a temperature monitoring and cooling means to prevent heat degradation of the components contained in therein. Such enclosure provides the present invention the additional benefit of having the capability to mount necessary electrical components within the housing such that no external circuitry, recording device, or computers for calculations are needed outside the pyrometer, making it a self contained unit, readily mobile and thus providing for an improved method of making a temperature measurement in the furnace.

Shah discloses that a outer sleeve 24 may be used for cooling the lens tube by circulating a cooling fluid, or the outer end 10b may be connected to a cooling nitrogen gas supply, so that the nitrogen contents are purged into the interior of the combustion chamber. However, the tube cooling apparatus of Shah does not teach or suggest the additional step of aspirating the lens as provided for in the present invention. Further, as with Cashdollar, Shah fails to teach or suggest providing a watertight electrical enclosure connected to the lens tube for housing electrical components, and providing the enclosure with a temperature monitoring and cooling means to prevent heat degradation of the components contained in therein. Instead, Shah teaches providing a remote signal processor (FIG. 1) which includes and amplifying circuit 62 and an analogue-to-digital converter and sampling circuit. (Column 5, Lines 13-15)

Accordingly, applicants submit claim 16, as amended, overcomes Examiner's rejection under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,142,417 to Cashdoller et al in view of U.S. Patent 4,780.832 to Shah, and that claims 17-19 overcome Examiners rejection under 35 U.S.C. 103(a) due to their dependence on rejected base claim 16.

Applicants further submit that claims 16-24 as presented are in condition for allowance, and respectfully request timely Notice of Allowance be issued in this case.

Applicants have endeavored to make the foregoing response sufficiently complete to permit prompt, favorable action on the subject patent application. In the event that the Examiner believes, after consideration of this response, that the prosecution of the subject patent application would be expedited by an interview with an authorized representative of the Applicants, the Examiner is invited to contact the undersigned at (330) 860-6605.

Respectfully submitted,

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